

CLAIMS

What is claimed is:

1     1. A circuit that is coupled to a transducer that can  
2     drive a cutting element, wherein the transducer has a  
3     natural frequency and can operate in a resonant mode,  
4     comprising:

5         a control circuit adapted to provide a driving signal  
6     to the transducer, said driving signal including a  
7     plurality of pulses provided in a time duration that does  
8     not induce the transducer to operate in the resonant mode.

1         2. The circuit of claim 1, wherein said pulses are  
2     provided in a plurality of packets that are separated by  
3     pauses.

1         3. The circuit of claim 1, wherein said pulses have a  
2     frequency approximately at the natural frequency of the  
3     cutting element.

1         4. The circuit of claim 2, wherein each packet has a  
2     time duration between 0.5 and 5 milliseconds.

1           5.    The circuit of claim 2, wherein each pause has a  
2 time duration that prevents a generation of a significant  
3 amount of heat by the cutting element.

1           ~~6.    A tissue cutting device, comprising:~~  
2           ~~a cutting element;~~  
3           ~~a transducer that moves said cutting element, said~~  
4           ~~transducer having a natural frequency and can operate in a~~  
5           ~~resonant mode;~~  
6           ~~a control circuit that provides a driving signal to~~  
7           ~~said transducer, said driving signal including a plurality~~  
8           ~~of pulses provided in a time duration that does not induce~~  
9           ~~said transducer to operate in the resonant mode.~~

1           7.    The device of claim 6, wherein said pulses are  
2 provided in a plurality of packets that are separated by  
3 pauses.

1           8.    The device of claim 6, wherein said pulses have a  
2 frequency approximately at the natural frequency of the  
3 driving element.

1           9.    The device of claim 7, wherein each packet has a  
2 time duration between 0.5 and 5 milliseconds.

1           10. The device of claim 6, wherein the resonant mode  
2 is in an ultrasonic frequency range.

1           11. The device of claim 6, wherein said cutting  
2 element is a tip.

1           12. The device of claim 7, wherein each pause has a  
2 time duration that prevents a generation of a significant  
3 amount of heat by the cutting element.

1           ~~13.~~ A method for driving transducer that moves a  
2 cutting element, wherein the transducer has a natural  
3 frequency and can operate in a resonant mode, comprising:  
4           transmitting a driving signal to the transducer, said  
5 driving signal including a plurality of pulses provided in  
6 a time duration that does not induce said transducer to  
7 operate in the resonant mode.

1 14. The method of claim 13, wherein the pulses are  
2 provided in a plurality of packets each separated by a  
3 pause.

1 15. The method of claim 14, wherein the pulses are at  
2 a frequency at approximately the natural frequency of the  
3 transducer.

1 16. The method of claim 14, wherein each pause is of a  
2 duration to prevent a significant generation of heat by the  
3 cutting element.

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